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L4: Entry 1 of 2

File: USPT

Oct 19, 2004

US-PAT-NO: 6807466

DOCUMENT-IDENTIFIER: US 6807466 B2

TITLE: System and method for steering a multi-wheel drive vehicle

DATE-ISSUED: October 19, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Strothmann; Thomas	Wallenhorst			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Invacare Corporation	Elyria	OH			02

APPL-NO: 10/279606 [PALM]

DATE FILED: October 24, 2002

PARENT-CASE:

CROSS-REFERENCES TO RELATED APPLICATIONS This application is a continuation of application Ser. No. 09/773,793, filed Feb. 1, 2001, now U.S. Pat. No. 6,526,336, and titled "System and Method for Steering a Multi-Wheel Drive Vehicle."

INT-CL-ISSUED: [07] G06F 7/00

INT-CL-CURRENT:

TYPE IPC	DATE
CIPS <u>B62 D 5/00</u>	20060101
CIPS <u>B62 D 9/00</u>	20060101
CIPS <u>B62 D 11/00</u>	20060101
CIPS <u>B62 D 11/02</u>	20060101

US-CL-ISSUED: 701/1; 701/89, 701/90, 701/41, 701/81

US-CL-CURRENT: 701/1; 701/41, 701/81, 701/89, 701/90

FIELD-OF-CLASSIFICATION-SEARCH: 701/1, 701/89, 701/90, 701/41, 701/81

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<input type="checkbox"/>	<u>3897840</u>	August 1975	Molzahn et al.	
<input type="checkbox"/>	<u>4322670</u>	March 1982	Taylor	
<input type="checkbox"/>	<u>4334694</u>	June 1982	Iwanicki	
<input type="checkbox"/>	<u>4754824</u>	July 1988	Olsson	
<input type="checkbox"/>	<u>4790399</u>	December 1988	Middlesworth	
<input type="checkbox"/>	<u>4926954</u>	May 1990	Ataka et al.	
<input type="checkbox"/>	<u>5109694</u>	May 1992	Yahagi et al.	
<input type="checkbox"/>	<u>RE34057</u>	September 1992	Middlesworth	
<input type="checkbox"/>	<u>5157611</u>	October 1992	Ikeda et al.	
<input type="checkbox"/>	<u>5168953</u>	December 1992	Naito	
<input type="checkbox"/>	<u>5305218</u>	April 1994	Ghoneim	
<input type="checkbox"/>	<u>5769510</u>	June 1998	Akuzawa et al.	
<input type="checkbox"/>	<u>5794203</u>	August 1998	Kehoe	
<input type="checkbox"/>	<u>5879061</u>	March 1999	Koibuchi	
<input type="checkbox"/>	<u>6072424</u>	June 2000	Cremona et al.	
<input type="checkbox"/>	<u>6167354</u>	December 2000	Maleki et al.	
<input type="checkbox"/>	<u>6223116</u>	April 2001	Kin et al.	
<input type="checkbox"/>	<u>6275753</u>	August 2001	Kyrtsos	
<input type="checkbox"/>	<u>6282479</u>	August 2001	Ghoneim et al.	
<input type="checkbox"/>	<u>6295487</u>	September 2001	Ono et al.	
<input type="checkbox"/>	<u>6313742</u>	November 2001	Larson	
<input type="checkbox"/>	<u>6526336</u>	February 2003	Strothmann	701/1

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
WO 93/08063	April 1993	WO	
WO 00/32462	June 2000	WO	

ART-UNIT: 3661

PRIMARY-EXAMINER: Black; Thomas G.

ASSISTANT-EXAMINER: Hernandez; Olga

ATTY-AGENT-FIRM: Pejic; Nenad Calfee, Halter & Griswold

ABSTRACT:

A system and method of controlling a multi-wheel drive vehicle is provided. The

invention is preferably applicable to the steering of such a vehicle and determines the individual velocities for each wheel drive. In this regard, the invention includes two general steps. The first step includes determining the distance of each wheel drive and a vehicle velocity reference point from a turning reference point. The second step includes ratioing each wheel drive's distance from the turning reference point with the vehicle velocity reference point's distance from the turning reference point. The ratios are then applied to a vehicle velocity associated with the vehicle velocity reference point to determine the velocity of each respective wheel drive. Once determined, the velocities are output to each wheel drive.

23 Claims, 5 Drawing figures

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L4: Entry 2 of 2

File: USPT

Feb 25, 2003

US-PAT-NO: 6526336

DOCUMENT-IDENTIFIER: US 6526336 B2

TITLE: System and method for steering a multi-wheel drive vehicle

DATE-ISSUED: February 25, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Strothmann; Thomas	Wallenhorst			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Invacare Corp.	Elyria	OH			02

APPL-NO: 09/773793 [\[PALM\]](#)

DATE FILED: February 1, 2001

INT-CL-ISSUED: [07] G06F 7/00

INT-CL-CURRENT:

TYPE IPC	DATE
CIPS B62 D 7/15	20060101
CIPS B62 D 9/00	20060101
CIPS B62 D 11/04	20060101
CIPS B62 D 11/02	20060101

US-CL-ISSUED: 701/1; 701/89

US-CL-CURRENT: [701/1](#); [701/89](#)FIELD-OF-CLASSIFICATION-SEARCH: 701/1, 701/89, 701/90, 701/41, 701/81
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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PAT-NO

ISSUE-DATE

PATENTEE-NAME

US-CL

☐[3897840](#)

August 1975

Molzahn et al.

180/6.48

<input type="checkbox"/>	<u>4322670</u>	March 1982	Taylor	318/587
<input type="checkbox"/>	<u>4334694</u>	June 1982	Iwanicki	280/154.5
<input type="checkbox"/>	<u>4754824</u>	July 1988	Olsson	180/6.48
<input type="checkbox"/>	<u>4790399</u>	December 1988	Middleswrth	180/6.2
<input type="checkbox"/>	<u>4926954</u>	May 1990	Ataka et al.	180/140
<input type="checkbox"/>	<u>5109694</u>	May 1992	Yahagi et al.	73/9
<input type="checkbox"/>	<u>RE34057</u>	September 1992	Middlesworth	180/6.2
<input type="checkbox"/>	<u>5157611</u>	October 1992	Ikeda et al.	364/426.02
<input type="checkbox"/>	<u>5168953</u>	December 1992	Naito	180/197
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<input type="checkbox"/>	<u>5794203</u>	August 1998	Kehoe	704/271
<input type="checkbox"/>	<u>5879061</u>	March 1999	Koibuchi	303/146
<input type="checkbox"/>	<u>6072424</u>	June 2000	Cremona et al.	342/109
<input type="checkbox"/>	<u>6167354</u>	December 2000	Maleki et al.	702/147
<input type="checkbox"/>	<u>6223116</u>	April 2001	Kin et al.	701/82
<input type="checkbox"/>	<u>6275753</u>	August 2001	Kyrtsos	701/36
<input type="checkbox"/>	<u>6282479</u>	August 2001	Ghoneim et al.	701/70
<input type="checkbox"/>	<u>6295487</u>	September 2001	Ono et al.	701/22
<input type="checkbox"/>	<u>6313742</u>	November 2001	Larson	340/442

ART-UNIT: 3661

PRIMARY-EXAMINER: Cuchlinski, Jr.; William A.

ASSISTANT-EXAMINER: Hernandez; Olga

ATTY-AGENT-FIRM: Pejic; Nenad Calfee, Halter & Griswold LLP

ABSTRACT:

A system and method of controlling a multi-wheel drive vehicle is provided. The invention is preferably applicable to the steering of such a vehicle and determines the individual velocities for each wheel drive. In this regard, the invention includes two general steps. The first step includes determining the distance of each wheel drive and a vehicle velocity reference point from a turning reference point. The second step includes ratioing each wheel drive's distance from the turning reference point with the vehicle velocity reference point's distance from the turning reference point. The ratios are then applied to a vehicle velocity associated with the vehicle velocity reference point to determine the velocity of each respective wheel drive. Once determined, the velocities are output to each wheel drive.

24 Claims, 5 Drawing figures

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Application
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IDS Flag Clearance for Application 10815308

IDS
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M844	2005-03-17	23	Y <input checked="" type="checkbox"/>	2005-04-11 13:25:27.0	elane
M844	2004-04-01	11	Y <input checked="" type="checkbox"/>	2004-07-20 16:22:10.0	gmyers
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